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Bulletin of the
Society for the Promotion of Engineering Education

VOL. XII LANCASTER, PA., SEPTEMBER, 1921 NO. 1

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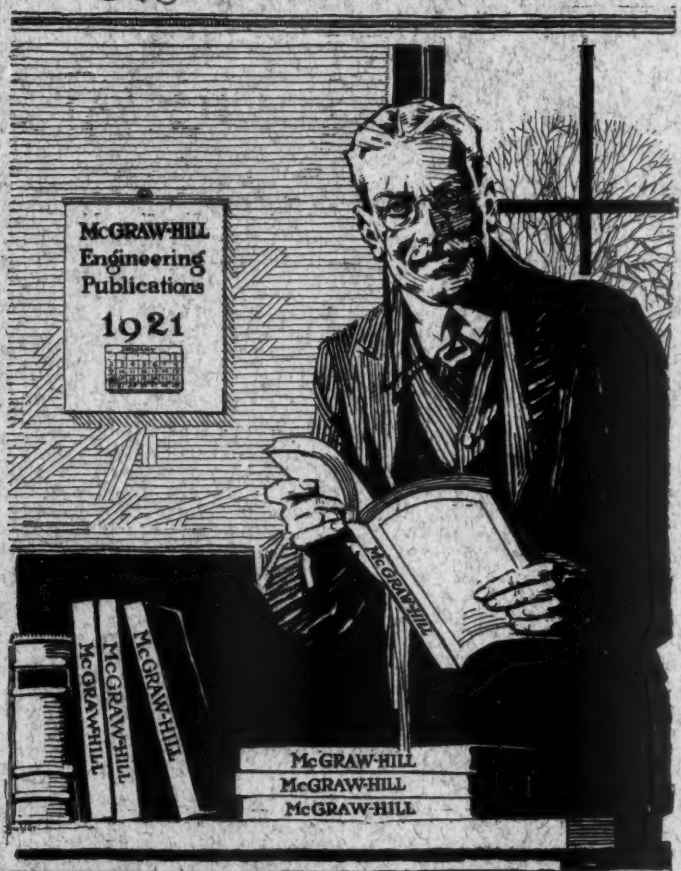

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ENGINEERING EDUCATION

Bulletin of the
Society for the Promotion of Engineering Education

Published under the supervision of the Publication Committee:

Chas. F. Scott, Mortimer E. Cooley, F. L. Bishop, *Editor.*

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FOREWORD.

CHARLES F. SCOTT,

President of the Society.

The incoming President presents his greetings to the members of the Society and proposes a plan for the general activity by the membership at large for promoting engineering teaching. One of the important functions of the Society is to bring the individual teacher in contact with ideas of others. One means is the discussion of our teaching problems by the instructors of the engineering staff in each school.

Local Meetings in October.

Our Society members in each institution are requested (and directed by all the authority possessed by the President) to hold an initial meeting in October for the discussion of questions relating to teaching. The meeting should be informal and open for free discussion, particularly by the younger men. Subject matter should be treated in a definite, concrete and specific manner. Methods of presenting subjects to students in class room or laboratory and the specific ways of arousing interest in students of different kinds are suitable topics.

Many younger instructors have had technical training and practical experience but are untrained and inexperienced in teaching. In practice more engineers fail from lack of general qualities than from lack of technical proficiency. Likewise, in engineering teaching, more men fall short on account of poor teaching ability than from lack of technical qualifications.

In meeting the general criticism of some years ago that engineering teachers were theoretical and unfamiliar with practice, we have emphasized practical experience as a requisite qualification of the teacher, but have neglected ability to teach.

In Engineering Education our Society has emphasized the

first word and neglected the second. Is not the one as important as the other? Is not the ability to teach the great quality of the great engineering teacher? Has not the engineering teacher who is making the engineers of the future as important a function as the engineer in practice? The present purpose is to direct the activities of our Society to the upbuilding of engineering by making our engineering teachers better teachers.

No specific plans for local meetings would be uniformly applicable. Each institution has its own internal conditions and the methods best adapted to existing organization and personnel must be worked out in each case. A few guiding suggestions may be serviceable.

The meetings of engineering instructors should differ in methods from many faculty meetings. They should not be dominated by a dignified official. They should not deal with routine matters of a red-tape sort. They should not devote too much attention to the inferior and indifferent student, but should preferably consider the best development of the best student. The active thought and questioning and controversy should be among the younger men, while those who are older sit by and comment in the light of their larger experience. The object is not to impart authoritative information to young instructors, but to awaken their interest and lead them to constructive study of the objects and methods of teaching. A leading object of education is to awaken independent activity in the student. Let us practice ourselves what we preach to our students.

While these meetings are organizations of the Society members, they should be participated in by the whole engineering teaching staff and also by all teachers of engineering students in other departments, such as mathematics, physics, English, etc. Others, such as high-school teachers, practicing engineers and manufacturers may be invited; but initially the purpose is consideration and discussion of methods of teaching by teachers themselves. Those who are not members now may soon become members.

Topics for Local Meetings.

Topics proposed for local meetings by several members, together with comment by the authors, are as follows:

1. What is Good Teaching? There is much difference of opinion as to what constitutes good teaching, and until we come to some understanding or agreement as to the *ideals*, discussion of *methods* is premature.

2. Specifications of a good engineering teacher.

3. Hints on conducting recitations. Formal paper by an experienced teacher, several formal discussions and general discussion.

4. Hints on conducting a laboratory class.

5. Hints on conducting a design or drafting room class.

6. Characteristics of my own best teacher. Personal reminiscences of student days; a paragraph from everybody.

7. Methods for arousing the interest and the initiative of the student. What have been successful in different cases?

8. How can engineering education be humanized?

9. How can we maintain closer contact between the older engineering professors and the engineering students?

10. A recent satisfactory incident in my own teaching. An experience meeting; how a point was made clear; how a student was aroused; how class effort was stimulated; how team work in laboratory was secured. A paragraph from everybody.

11. The practical problem as a method of teaching theory.

12. Preparatory work; for the student; for the teacher. This could deal with the amount of text to be studied; the advisability of having practical problems assigned simultaneously with theoretical subjects, or alternating them; the method of working out problems by students (in computation periods with supervision, or at home); individual work vs. group work.

13. Examinations; their purpose; the results accomplished. (Later in the year.) Are examinations of value in judging a student's knowledge or are they of primary value in giving

him a general review of the whole subject in a one-day preparation? Problems with permission to use text, notes and handbooks, vs. problems with no auxiliaries.

14. The aims and objects of specific courses. Are they intended as instruments to be used in the engineering life to follow, or to train the student primarily in the method of attacking problems and solving them?

15. Should English and economics be taught as a part of all other subjects in the curriculum?

16. What subjects and what methods of instruction are most suitable in preparing students for industry and commerce?

17. How can students be trained in the use of the library?

18. The value of collateral reading for the teacher.

19. How can the cost of engineering education be reduced? More work by student and less by instructor; more students per instructor; better instructors; change in laboratory methods, etc.

20. "My suggestion is that you do not urge calling meetings merely to vaporize on pedagogic methods, but that you set the local groups tasks like these: Specify in detail the things an engineer must be able to do. Make a list of the problems in physics, mechanics, descriptive geometry, etc., which every engineer meets in practice and must be able to solve. Specify the things that every engineer must be able to do and the things that only a mechanical, an electrical and a civil engineer must be able to do. Specify standards of proficiency by which it is possible to determine objectively when a man can properly do each required job."

The foregoing is not a program—it is a group of ideas; every instructor should furnish his local committee with a topic; from the combined lists a schedule for coming meetings can be chosen, preferably a progressive program. This year's experience will be a fine basis for next year's plans when the range of topics may be broadened.

Organization of Local or Branch Meetings.

In each institution, the Society representative or delegate to the last annual meeting should appoint a committee to decide upon the place, the time (possibly following an informal dinner), the topic, and the principal speakers for the first meeting.

If there be no representative, or if he does not take action early in October, let some self-constituted committee act.

At the meeting a simple, permanent organization should be effected. Presumably an executive committee with chairman, secretary and one or more others may be given general charge. The meeting may appoint other committees, such as program, editing, refreshments,[1] etc., or may leave these appointments to the executive committee. It may be well to assign the successive meetings to different sub-committees in order to give active work to many men and contribute to variety and interest and a competition in successful management.

The local branch must be self exciting and self dependent; it is not to depend upon instructions and detailed directions from headquarters—these will be few; its success will depend on local initiative and energy; it should be largely a young men's movement.

The local secretary should report promptly to the Society's Secretary the date, topic and attendance at each meeting; he should also send a summary of the really best things suitable for the Society Bulletin, prepared by himself or by the editing committee if there be one.

Sections and Branches.

At the Baltimore meeting two years ago, the Society provided for the organization of Sections. The wording of the

[1] A large and successful night school has gotten much of its spirit and team work from a weekly teachers' luncheon of sandwiches and pie and coffee. At Yale in two departments, there is a noon lunch of the instructors each week in the laboratories and Sigma Xi members listen to lectures knowing that crackers and cheese will follow.

resolution evidently contemplated geographical divisions, but it states that "sections may be formed in any locality by temporary organizations which shall become duly authorized sections of the Society for the Promotion of Engineering Education upon approval by the Council."

The sections which have been formed are:

Pittsburgh Section (including University of Pittsburgh and Carnegie Institute of Technology, and members from several industrial companies, consulting engineers, high-school teachers, and others).
Kansas-Nebraska Section (indicated by name).
Georgia Tech Section (Georgia Institute of Technology).
New England Section (indicated by name).

In certain districts such as Pittsburgh, several institutions are so closely located that frequent meetings may be held. Where several states are involved only occasional meetings are feasible.

I am not now considering whether or not the meetings in the several institutions for which the call is now issued, may be considered "Sections" of the Society under the Baltimore resolution. The present object is to bring our individual members into active local meetings. The local group in an institution may well be called a Branch, reserving the term Section for the larger groups.

Let us start with the small unit and as interest and conditions justify the Branches may group themselves into Sections. The annual meeting of the general Society through its facility for personal and professional intercourse, is one of the important features of the Society, but only about ten per cent. of the members attend such meetings. Let us extend the advantages of discussion and intercourse by our Branch and sectional meetings.

A score of years ago our national engineering societies had few activities other than the general convention and the monthly meeting in New York. Now these societies have many active sections and student branches. These are in the main

self-governing and self-exciting. The merit of this method is proven by growth and activity. There is a general feeling among members that the local is more beneficial than the national organization.

Sections and branches of some of the national societies started without bylaws or rules; they began by holding meetings and were free to develop the form of organization which would best meet the needs and opportunities as they developed. Later on from the experience gained, bylaws and more formal methods were adopted. The same plan may well be followed now by our educational society. Let each group determine the most effective way to accomplish its purpose, then interchange of ideas and plans will naturally lead to improved methods. We can then determine what form of sub-organization of the Society will best coordinate the local meetings, the section meetings and the general convention.

"Engineering Education."

Our monthly Bulletin is the general means of interchange of information and ideas. The cream of the discussion at the local meetings will enrich the Bulletin, thus making it of concrete usefulness and service to our younger teachers. At the New Haven meeting the topic which impressed me most was the symposium on training of engineering teachers:

"A. What is being done to improve the personnel of teachers?

"B. What is being done to train teachers for their work?"

The inadequacy of the discussion emphasizes our weakness. The New Haven session which impressed me most was the round table discussion, and the things in this discussion which impressed me as the most effective were the definite statements of concrete experiences. Let us now utilize these three impressions by extending to individual institutions, round table discussions which will bring forward concrete experience and definite methods as the basis for the training of our engineering teachers.

The real usefulness and success of the Society can not come through acts of its Council or its officers or its committees, but will result from the general activity of everybody. The present proposition is that everybody take hold and do his part. The BULLETIN will coördinate and unify the local meetings by bringing the best products of many meetings to all our members.

TWO FUNCTIONS OF S. P. E. E.

Our Society may be likened to a ship; most of its members have the routine of running the educational machinery, while others stand on the bridge and see which way we are going and determine which way we ought to go. And this latter task is not easy. What is the place of the engineer in his profession and in society today, and what will it be tomorrow? We are in the midst of profound and rapid changes in the ways of modern life, for which engineering itself is largely responsible, and which in turn bring larger tasks and new obligations to the engineer. The older phase of engineering is typified by the professional engineering societies and broadly speaking our Society has been of that type in the past. The newer or supplemental relations are expressed on the one hand by administrative engineering courses in the colleges and on the other by The Federated American Engineering Societies—engineers in business and in the public service. The engineer can no longer be narrowly professional. Yet when we attempt to visualize the ideal modern engineer and proceed to specify his manufacture by deciding upon the sort of boy to start with and the subjects in his curriculum and the number of years he should attend school and the practical experience he should have before graduation, we find uncertain and conflicting views. Some say we should know these things before we can do good teaching. But we cannot stop while these problems are being solved—the solution must change as the world changes, there may be no final answer until social progress ceases.

Whatever the answer may be to the larger questions the im-

mediate task before every instructor is to teach the student. He is here now, he is the unit, and he always will be. To teach him—to develop and train him, to unfold and draw out his own best powers, to give him vision and self expression, to change the boy-freshman into the graduate, ready to enter a life work—that is the real problem. It is the problem of teaching.

THE PERSONAL RELATION OF THE PRESIDENT TO HIS OFFICE.

When several Past-Presidents informed me that the nominating committee had honored me in its selection as the prospective president, I urged that other duties would prevent my giving to the Society the time and attention which would justify my serving as president. I was assured of the active cooperation and personal assistance of the members of the committee in order that the burden of the office might be lightened. I was furthermore assured that I need not feel the responsibility of doing many things, but if I would contribute to the Society a single helpful idea and put it into effect, I would have met my obligation.

I am not only taking my good friends at their word that they were ready to help, but I am calling upon every member to do his part in putting the work of the Society upon a new plane. The ideas and plans which I have proposed are local meetings and the development of sections for the important object of promoting engineering teaching.

[Paragraphs pertaining to the organization and activities of the Society prepared by the President as a part of the Foreword, will appear in the October issue.]

YALE MEETING.

The 29th annual meeting of the Society was held at Yale University from June 28 to July 1. The program as given in the combined May and June numbers of ENGINEERING EDUCATION was carried out in detail. The housing of the guests in the New Memorial Quadrangle proved an inspiration to everyone. The attendance was 339; by far the largest in the history of the Society.

The following officers were elected:

President: Charles F. Scott, Yale University.

Vice-Presidents: H. J. Hughes, Harvard University, E. J. McCaustland, University of Missouri.

Secretary: F. L. Bishop, University of Pittsburgh.

Treasurer: W. O. Wiley, New York City.

Members of the Council to serve for three years: P. H. Daggett, University of North Carolina, J. H. Dunlap, State University of Iowa, M. L. Enger, University of Illinois, J. C. L. Fish, Leland Stanford Jr. University, F. E. Giesecke, University of Texas, Morris Knowles, University of Pittsburgh, O. M. Leland, University of Minnesota.

The Proceedings for this meeting are now in the hands of the printer and if printing conditions improve sufficiently, they will issued early in the year.

The entertainment furnished by the local committee included an organ recital by Professor Jepson; lunch at the New Haven Lawn Club, and the luncheon and dinner at the New Haven Country Club, the automobile trip furnished by the Kiwanis Club and the shore dinner are simply indications of the delightful opportunities afforded for social intercourse. Closer coöperation with the Navy was secured through the courtesy of Honorable Edwin Denby, who placed at the disposal of the Society through President Cooley, three destroyers; these destroyers took members of the Society to the Submarine Base at New London. Members had an opportunity to inspect the Submarine Base, after which submarine maneuvers were carried out.

Actions taken by the Society and the Council.

1. The Program Committee was instructed to devote one session of the next annual meeting to the discussion of the paper by Dr. Burr, limiting the discussion to five minutes. Other papers might be included in this discussion if desired.

2. The Council was asked to consider the question of carrying forward the survey conducted by Dr. Mann to see if further progress cannot be made in that direction.

3. The Secretary's office was authorized to act as a clearing house for engineering instructors; the object being to secure from different institutions men who are available for work in other institutions.

4. It was voted to take a referendum vote of the institutional members on the question of increasing their dues from $10 to $25.

5. The officers of the Society were instructed to send a letter of greeting to the exchange French professors who are coming to this country under the auspices of certain of the institutions in the East.

6. A Membership Committee was authorized to consist of a general committee of five, and a district committee composed of representatives of each institution. (The President has appointed Dean A. A. Potter, Purdue University, LaFayette, Ind., General Chairman. District 1, H. S. Boardman, Chairman. This district will include the States of Connecticut, Maine, Massachusetts, New Jersey, New Hampshire, New York, Rhode Island and Vermont. District 2, T. E. French, Chairman. This District will include the States of Pennsylvania, Ohio and Michigan. District 3, A. C. Lanier, Chairman. This district will include the States of District of Columbia, Alabama, Arkansas, Delaware, Cuba, Florida, Georgia, Kentucky, Louisiana, Maryland, Missouri, Mississippi, Oklahoma, Tennessee, Virginia, West Virginia, North Carolina, and South Carolina. District 4, G. R. Chatburn, Chairman. This district will include the States of Iowa, Colorado, Kansas, Minnesota, Wisconsin, Nebraska, North Da-

kato, South Dakota, Indiana and Illinois. District 5, B. F. Raber, Chairman. This district will include the States of Arizona, California, Idaho, Montana, Nevada, New Mexico, Oregon, Texas, Utah, Washington and Wyoming.

Representatives in foreign countries will be listed in the October BULLETIN.

7. The subject of licensing engineers was discussed and the President authorized to appoint a committee of three.

8. It was voted to coöperate with the American Association for the Advancement of Science in arranging the program for one session at the Toronto meeting in December, and to cooperate with the American Society of Mechanical Engineers in their December meeting. (The program in conjunction with the A. S. M. E. will be held on Thursday afternoon, December 8.)

9. The invitation of the University of Illinois to hold the 1922 meeting at that University was unanimously accepted.

10. The subject of modification of the BULLETIN, decreasing its size, was thoroughly discussed and the Council voted to continue it in its present form and to increase its effectiveness to the members. The chairmen of standing committees will, by action of the Council at the Michigan meeting, act as coöperative editors.

11. The difficulty encountered by omitting the publication of the year book for 1921 was thoroughly discussed and the Council voted that hereafter the year book should be issued annually.

12. The question of joining The Federated American Engineering Societies was presented and the Society voted to defer action.

13. The Society elected to membership the following: Bhole, V. R., Dale, R. B., Miller, J. S., Jr., Stansfield, Alfred, Alden, C. R., Macalpine, J. H., McCabe, F. T., Tudsbury, C. W., Varney, E. A., Voss, W. C., The University of Arkansas, The College of the City of New York, The Johns Hopkins University, Swarthmore College, The University of Tennessee, The Tulane University of Louisiana, and Union College.

PRESIDENTIAL ADDRESS.
SOME HOMELY IDEALS OF EDUCATION.

MORTIMER E. COOLEY.

Retiring President of the Society.

In the opportunity which has been afforded me to address you I have felt that I might be justified in placing before you some views arising out of my many years of experience as a teacher; and have therefore chosen for my subject, "Some Homely Ideals of Education." By homely I do not mean rude, coarse, uncomely, unlovely or unadorned. I use the word in its old English sense of meaning plain, simple, severe, chaste, belonging to the home, domestic. The meaning I would have you get springs from the heart rather than the senses, and signifies quality apart from appearance; the things we feel confidence in, love and admire for the good in them.

An Englishman calls his sweetheart a homely woman and thereby pays her the greatest compliment, meaning that she will grace his home and together they will become the heads of a family of the kind which builds up nations and makes them strong and enduring. He is proud of her womanly qualities—those which one feels and knows exist in the dark. For him it is the homely qualities which constitute the basis of real love, respect, and admiration, such as we feel for our mothers.

Every college is a great family, embracing sons and daughters of families widely scattered over our own country and foreign countries. Whatever brings them to college, they should be made to realize as soon as possible what it is their new mother, *alma mater*, can do for them in the few years they are to bide with her; and they should be influenced by her homely virtues, those which make for manly strength and courage, value and merit.

While in college they should become imbued with that spirit which when they leave to go back to their homes, or to whatever places their work in the world may call them, there will go with them the desire to be a good influence in their community; there will go with them eyes to see beyond the glamor of worldly things and to select out of the complexities of life those things which are good for us as a people, the homely things which will make our nation strong and virile; there will go with them the desire and ambition to bring these homely things to the fore, put them in their proper place and keep them there, and so push back behind them the constantly increasing multitude of things which catch and fascinate the eye, which hypnotize us into believing that they are the real things of life.

Some go to college with the idea that it is a finishing or polishing school, and that their chief object is to acquire culture. Culture is a good thing—that part of it which is enlightenment and discipline acquired by mental training. But there is another part which comes from our home life and associations; it more often is inherited. I mean the refinement and good manners found in well-bred people. Culture is also defined as a product of civilization—but in the old dictionaries when civilization meant differentiation from barbarism. Today civilization, in this country at least, would scarcely be considered to add to our culture and refinement and homely qualities.

In the old days we were accustomed to spend our Sundays in the quiet of our homes, to attend church, to strike a trial balance between the worldly and spiritual things of the week. Some took a bath, shaved, and put on a clean shirt, and were nearer their God. Others counted their flocks and learned their children's names; saw their barefoot boys and girls dressed in clean little frocks, shoes and stockings, and off to Sunday School. For one and all it was a good day—the boyhood Sunday of the older men present.

But now we spend our Sundays differently. Compara-

tively few go to church, and the Bible no longer occupies the place of honor on the center table. Today the masses can be roused to religious enthusiasm only by an earthquake or some revivalist who indulges in the most extravagant language and justifies it to himself as the only effective way to reach the people in these modern times. Let me ask you, teachers of our young men and women, to compare the Sabbath teaching of the old day with the Sunday teaching of the new day. Which is better for your children, the plain, simple, unornamented, homely, religious action and thought of the old day, or the ornamented, big-sounding, inflated and acrobatic action and thought of the new day? And this is the direct outgrowth of our civilization, one of the factors in our old definition of culture.

I like to think of culture as springing from the heart, as the flower of the plant grown in the home and school and matured in an atmosphere of refinement, its roots being the homely virtues, such as were possessed by our old-fashioned folk.

I do not want to leave that word civilization yet. I have not a high respect for our modern form of it, particularly in its effects on our ideals of education. Much is being thought about it and written. The editors of newspapers, even, have something to say occasionally; and it is very refreshing to find them forgetting for the moment the commercial end of their business by excluding some highly seasoned morsel craved by a jaded and degraded public palate to say a word in favor of the homely virtues of life.

The Baltimore *Sun*, commenting on a new profession for women, namely, keeping a bookstore, an idea advanced by Professor Earl Barnes, said:

"The insuperable obstacle to the Barnes idea is that though there are no end to the books published and read, the number bought and owned is ridiculously small. Walter H. Page, American Ambassador to Great Britian and a member of a large publishing house, is credited with the statement that

American men spend more for neckties and American women more for buttons, than either spend for books. People no longer seem to care to own books notwithstanding the pleasure the real lover of literature finds in possession.

"Both men and women say they have no time for reading. The automobile, the phonograph, picture shows, newspapers and periodicals, not to mention the endless 'social activities' and sports, absorb the hours formerly given to books. Children grow up without acquiring a taste for reading; their school work is too exacting; it is a verifiable fact that after the fourteenth year a boy seldom has the desire to read. Thus one great life anchor drags ineffective, for so long as a lad loves books he has occupation for his leisure which helps banish loneliness and often keeps him out of mischief."

Would that more editors, men who constantly have their fingers on the public pulse, wrote about these homely things. What a mighty force lies in them to quicken the spirit. What a pity it is that the newspaper can be successful in the commercial sense only by pandering (I apologize for the word) to a craving of the public for the sensational. But they are run to make money. What better evidence of the character of our American civilization can be had than in the apology that the newspapers print the stuff they do because the public demands it.

Let us look at ourselves from another angle. The Springfield Republican, commenting on national defense, inquires:—

"Are Americans deteriorating? President Rittenhouse of the Life Extension Institute says that they are. . . . He is on safe ground in saying that the first essential is men, 'not merely brave, intelligent men, but men who can stand the excessive physical stress and strain of modern war.' Could America provide such an army? he asks, and answers the question by saying: 'Vital statistics indicate that as a body Americans are physically deteriorating.' If the present tendency keeps on 'we will have to depend upon a weak, soft-muscled, flimsy-fibred people for the defense of the republic.'

"This decadence may not be perceptible, he says, yet it is revealed by figures. Mortality from diseases of the heart, arteries and kidneys doubled in 50 years. So in discussing 'preparedness' it is important, he urges, to consider hygiene. 'The American people are specially in need of being taught how to eat correctly and to get the habit of taking natural exercise.'"

Let us have more of that kind of teaching, but in our schools, colleges and universities. More important still, let us have it in our homes where right doctrines should be taught from childhood. But parents are too indulgent. They want their children, those who find time and the inclination to have any children, to live in greater luxury and to have advantages denied themselves as children; or if not that, they shirk the responsibilities of parents in the matter of discipline and are themselves bossed or wheedled into permitting things being done against their better judgment.

What we need in our homes, as I see it, is a reversion to some of the homely things of earlier days when the father's or mother's word was law, and there was no talking back; when quinine was given off a knife blade, and not in capsules to hide the taste; when cayenne pepper was taken in hard cider for a cold; when for white spots on the tonsils burnt alum was shot into the throat from a paper tube with mother's good lungs at the other end of the tube; when after the snow was well off the ground boots and stockings were cast aside and not donned again (except on Sundays) until the first snowstorms next fall; when boys and girls were in such good physical condition that they could fall out of apple trees and encounter all sorts of mishaps without being disabled and sent to a hospital. There was mighty little petting in those days, and one's first thought after a bad tumble with torn clothes was how to escape the probable scolding or whipping if it got to the ears of father or mother.

Compare the young men of those days with the chap just out of college nowadays who rides from his home to a $10 a

week job, for which he receives $50, in an automobile. Then $400 a year was a liberal allowance for college. Now in the same college double and treble, or even quadruple that amount is spent, and this by the son of the father who spent the smaller amount. Is the son any better educated than the father? Is he any better man? Can he do more for his country? What then has been gained by living in greater luxury and comfort, and by doing the many things not formerly required, while in college?

A former professor in the University of Michigan, seeing a restaurant sign reading "meals 35 cents," said to a colleague: "When I came to Ann Arbor, walking all the way from New England, I lived a whole week on 35 cents."

The young men and women in our colleges today can scarcely believe what I am saying about the old days. It will tax their credulity even more to tell them that not many boys in those days wore either underclothing or overcoats—remember this is a homely address. A boy felt mighty warm with a tippet wrapped half a dozen times round his neck. But they were rugged lads. They grew on the homely things of life. A piece of apple pie in the old pie-cupboard was incentive enough for half a dozen boys to run the race of their lives over the forty rods between the old school house and home—and uphill at that. Compare the foot-race of those days down the cowpath in the lane with the affair of the cinder-path of today. Bare feet with a stone bruise on each heel compelling one to run on his toes, an old pair of trousers full of holes and frayed half way to the knee, a hickory shirt flapping in the wind,—that was the uniform down the cowpath; light spiked shoes, bare legs, running breeches and shirt with a big letter on the front,—the uniform of the cinder-path. The running time was the same, but the country boy, instead of lying on the grass to be pumped up after the race, continued on whistling and calling the cows.

In the old days there was the Little Red School House on the hill. The species has not become entirely extinct. Oc-

casionally one can still be found. The Baltimore *Sun* under the caption "The Modern School and the Little Red Schoolhouse" comments on an interview with Dr. Thomas S. Baker, headmaster of the Tome School.

"The most frequent complaint of the public schools in many states is the lack of thoroughness. So much is undertaken that nothing is done well. In this respect, perhaps, we have not improved upon the little red schoolhouse of fifty years ago. In those schools children were taught to spell, to read aloud intelligently; they were taught arithmetic and geography with thoroughness and the elements of English grammar. In all these things the average graduate of the grammar school of today is deficient. Spelling is becoming a lost art, and comparatively few can read aloud intelligently. As Dr. Baker says: 'Practical education is the catchword which is heard on every side.' The prime object of education, in the multiplicity of ornamental and practical studies, is apt to be overlooked. That prime object is the training of the mind. Teach a boy to think, to reason, instill correct principles in him and he will do the rest—all the rest will be added." In conclusion the editor said: "The subject is of compelling interest."

Indeed it is, or should be, of compelling interest. What university teacher will not say that the boys and girls who come to him have not been taught how to study. Lack of thoroughness in preparation and not knowing how to study will account for the majority of failures in college; and surely it must also extend beyond college and account for many of the failures in life.

One great fault in our method of teaching, as I see it, is that we teach too much. We are prone to make the subject so simple that no brain work is required to understand it. Information, like bitter medicine, is put into capsules to be swallowed easily and without taste. Students should learn rather than be taught. The teacher should guide and expound, being always careful not to do the work the student should

do for himself. He should be the helmsman who steers the ship—not the power which propels it.

A college education should be to train young men and women to live their lives to the best advantage among their fellowmen, rather than to learn specific things. A perfect mind, like a perfect body, can be developed only by exercise and training.

The world demands men and women who can think independently rather than those who can think only as taught. The world progresses by development of new ideas rather than by the continued application of old ones. Individuality, integrity, independence of action, self-reliance, the ability to create, are all important elements of success in the world's work. Success is not measured so much in dollars as in the respect of one's neighbors.

We need to shape up our mental vision, to see more than is revealed in the classroom and laboratory. We should work to a plan of which studies are but details. It should not be forgotten that professors, profound though they be in their knowledge of specific subjects, are not examples to be followed in tackling the outside world—certainly not in a money-getting sense.

Let me call attention to another phase of our college life:—Less than 50 years ago there were comparatively few tailor shops, and ready made clothing was not the vogue it is today. The wool sheared from the sheep in the spring was sent to the woolen mill in the summer, and in the fall the sheepsgray cloth, a great roll of it, was worked into trousers—they were then called pants. And what pants they were! Mother made them off the same paper pattern for all the boys except that the legs were cut off in lengths to suit. When done they were so stiff they stood alone; they did not need to be creased and hung by the bottom to prevent bagging. One pair a year was the allowance and the same pair served for both ordinary and dress occasions.

Now what do we see? Boys with several suits of clothes,

and pressing shops around the corners; trousers shortened to come above the shoe tops, not from natural wear, but by careful rolling and pressing. Dress suits for evening functions with patent leathers and kid gloves for dancing. This is all very well, perhaps, and in keeping with modern ideas. But another side to it may be seen in many families of wage earners. To illustrate by an actual case, that of a locomotive engineer earning $175 a month. His son was complaining of hard times and the high cost of high living. He could not have everything he wanted. His own little earnings of $12 a week was but a pittance. His clothes, ties, silk stockings, and other impedimenta of the social game, together with flowers, cabs, and after theatre suppers, absorbed his own and a considerable part of his father's earnings. The sad part was that it seemed perfectly natural to him and proper that his father and mother, when they went out for an evening, should ride in the street car and be content with simple and homely things.

Even in our colleges most celebrated for their democracy and where many hundreds of students work to pay part of their expenses, there has been a manifest tendency in recent years towards greater elaborateness in social functions. While to dress in conformity to society's demands is proper and commendable, even a duty when one steps into society where it is customary, I query whether among students from all walks of life for some of whom the expense is a hardship, or quite impossible, it should come to be regarded as a necessity. Should we not aim constantly towards greater simplicity?

And now a word in behalf of Freshmen. They are away from home for the first time—most of them, and no longer under direct parental control and influence. They are passing from boyhood to manhood, from dependence on others to dependence on themselves. They have come to the point in life where they must begin to build the foundation of their future career. If it is to be brilliant and great, the foundation must be broad and deep. They have brought with them the

materials of construction in various degrees of suitability and preparation. Those materials must be passed through the rock-crusher—another name for the faculty, and the concrete-mixer—another name for the upper classmen, and finally tamped into place. If the crusher and mixer have each done their work, if the materials are clean and the cement is good, the foundation will endure. Then after graduation they may begin to erect the superstructure of their life as the world will see and know it. In the University the world knows nothing of the average boy or girl. Each is merely one among thousands, all children of *alma mater*, striving to win in an obstacle race of four laps, the prize being the diploma handed out on graduation.

Students should be advised to select those studies which will go farthest towards rounding out and balancing their education. This applies particularly to the colleges as distinguished from the professional schools. What this country needs today is more men and women educated for the common walks of life, those whose daily tasks are the humdrum or homely things of life, those for whom the specialist works, and from whom he receives his pay.

We are young, as nations go, a country still in the making. We must not forget the ideals of those who founded it. How homely they were in comparison with the ideals of civilization in which we find ourselves. We need to halt and take a calm look about us. But we must have eyes to see, minds to comprehend, and a sense of comparison going back to, and based on, the simple things of life—not the complex. Such doctrine will be hard to teach, I know, for our youth have grown up in an environment quite different; but our country, it seems to me, has come to the parting of the ways in education; and there rests upon us as teachers the responsibility, not so much to demonstrate text-book problems, as to point the way to the highest ideals of manhood and womanhood.

And finally, let me utter a word on the cosmopolitan life of our American campus, which I fear is not fully appreciated.

In the old days parents who could afford it, sent their sons abroad for travel. It is a fine addition to one's education to come into contact with other peoples and to sense something of their point of view. We Americans have lived a life altogether too provincial. But a change now confronts us; and however much we may regret it, we must henceforth take part in the game of nations—the oldest game on earth. What better place can there be than a college campus for the development of the high ideals so necessary if the peoples of the earth are to come together in peace and understanding? We cannot all of us go to foreign lands. Let us then make more of those who come to us from foreign lands. Let us encourage them to come to us in ever increasing numbers, and after biding with us for a time, return to their own countries to preach our ideals of friendship, until finally there shall be spread throughout all lands more of that understanding without which there can be no enduring peace.

LABORATORY PRACTICE.

BY F. W. GREVE,

Assistant Professor of Hydraulics, Purdue University.

The work in the laboratory should be closely allied to that in the class room as regards the sequence in which the subject matter is presented. Actually, a lack of harmony often exists because the experiments in the laboratory must follow a more or less rigid outline in order to meet schedule requirements. The ideal course is a flexible combination of both recitation and laboratory work. In such a course, the instructor would take the students to the laboratory at any time that he considered a demonstration necessary. The question naturally arises, would it not be sufficient for the instructor to go through the demonstration in the form of a lecture. The answer is in the negative for although the students will receive some benefits thereby, the gain will be measurably less than that obtained from experiments performed by the students. The student must actually handle the apparatus and go through the motions of the test if he is to acquire the maximum good. His brain has to be more than just receptive when he performs the experiment.

In the engineering laboratories, it is necessary to divide the class into groups. The number of students in each group should be kept at a minimum. If more than a sufficient number are included in a group, someone will loaf on the job, producing a demoralizing effect on the others. Keeping a student busy is the best way to keep his mind active. A leader must be assigned to each group to check out the apparatus and to take nominal charge of the party. His duties are to assign the men to the different positions and to make a trial test. However, the entire group should be impressed with the fact that all are responsible and that an error of

either omission or commission cannot be charged to the leader alone. The leader undertakes orderly progression of the work. The instructor acts as supervisor. The laboratory is the workshop. A recorder must also be assigned to note down the data which under no circumstances should be recorded on any paper other than the log sheet provided.

Instructions for conducting the experiment may be communicated either by lecture or by a laboratory manual. A manual lightens the instructor's work and has a distinct advantage where preparation is required. Its chief disadvantages are as follows: (1) A student often follows blindly the procedure as outlined in the text, thus adding nothing to the development of his initiative; and (2) the outline provides a handy model in which the student changes merely the order of the words and sentences and files the result as his description of the method pursued. Verbal instructions demand the close attention of the student to enable him to perform the experiment successfully. The reaction on the instructor acts as a stimulant—keeps him on his toes as it were. The instructor, in addition to bringing out the relation of theory to practice, should endeavor to show comparison with other machines and apparatus with which the student is familiar. Exhibits of research along the lines of the experiment are of value. The student should be made to realize that he is doing something worth while, not performing a routine piece of work, and the reaction will merit the effort expended. Let the student be guided by the idea that his work is analogous to that of an engineer who is preparing a report to a client.

Instructions should cover the following points: design and operation of the machine or apparatus; (2) purpose of the experiment; (3) manipulation of the apparatus; (4) explanation of the method; and (5) results to be expected. The students should then perform the experiment with as little supervision as is absolutely necessary. They thereby gain confidence in themselves and the knowledge that they are doing men's work. Place responsibility upon a man to get

results. The complaint is sometimes heard from students that their laboratory work is under what appears to them to be police supervision. This statement may seem far fetched and yet it must be remembered that confidence begets confidence. If the men rotate in their duties during the work, each one will not only become acquainted with every operation, but will also perceive the coördination between the several parts of the test and have a better understanding of the project in its entirety. One who sits on a chair and merely notes a single item—say the pressure—performs a mechanical act, with no effort of his brain and of no more use to his fellows than an automatic recording device.

Each student should submit a report. The manner of presentation should be left with the student to a considerable extent, such presentation to be graded as part of the report. Naturally, if instructions are given in detail, the report will be completed in the minimum length of time, but also with the minimum good to the student. In such a case, the report becomes largely a drafting exercise. When a group works together, the discussion that is bound to arise will be worth all the time consumed and of infinitely greater value than if complete explanations had been given in advance. Of course the instructor should be at hand to guide the discussion in the right channel. Laboratory work is too frequently mechanical in its operation, with too little freedom of thought and brain exercise. There are always some laggards to lean on their fellows when not under strict supervision, but the instructor can soon spot them and act accordingly.

The report should contain the customary items as follows: (1) title; (2) purpose; (3) description of plant and auxiliary apparatus; (4) line diagram; (5) method of conducting the work; (6) summary of data; (7) computations; (8) results; (9)graphs; and (10) conclusions. The purpose must define the title and state the given conditions. Changing a noun in the title to a verb in the purpose is inadmissible. For instance, if the title is "Calibration of a Meter," the purpose

should not be stated as, "To calibrate a meter." One elementary principle commonly overlooked by the student is that all the conditions governing the test cannot be varied if the results are to have any significance. Each piece of apparatus should be properly designated and the student informed of the reason for so doing. The reason is that if the results of a test are clearly erroneous, then the first thing to do is to recalibrate the instruments and if an error be found, then the original data can be corrected without going through the test a second time. A summary and not the entire data should be tabulated. As an example, the log sheet will contain a record of the initial and final amounts, but the net quantity alone is sufficient for the report. A single run or test should be given to each student for computations. This again enables him to coördinate the various operations and to make certain that he understands the work as a whole. If a student makes the calculations for a single vertical column, he is again performing a mechanical operation. It also affords the remainder of the group a chance to "pass the buck" if an error has been committed. One cannot expect in class laboratory exercises to duplicate results obtained by careful research, but the results should be characteristic. That is, the efficiency graph of an electric motor for example must be of one definite shape. Graph sheets should be self explanatory with title, scale and complete description. The graphs form a map of the results from which the conclusions are to be drawn. As many graphs as are possible should appear on one sheet for the purpose of comparison and deduction.

Time spent in correcting reports is well spent. Laboratory courses sometimes fail because of insufficient time and energy spent on their correction. If time will permit, all reports should be returned whether or not corrections are necessary. It is well to remember that the experiment is more than an exercise to establish a grade. A student profits by whatever corrections are noted and has a better understanding of the requirements for his future work. A student is inspired

with confidence when he receives a report graded as excellent. The English should be corrected as far as the instructor is able. Every course is an exercise in English, especially the writing of reports. It is well to keep posted a list of misspelled words. This may seem like drudgery, but it is worth while. Laboratory practice will be a success when a student'''s curiosity, initiative and sense of responsibilities are aroused.

USE OF CALCULUS IN MODERN MECHANICAL ENGINEERING LITERATURE.

BY JOHN WEBER,

Associate Professor of Mechanical Engineering, University of Pittsburgh.

The following tabulation was prepared as a result of a statement recently made by a prominent engineering educator to the effect that our engineering courses should embody a thorough study of calculus in order that the students and future engineers might intelligently read good engineering literature. A desire existed to establish the extent to which this statement applied to Mechanical Engineering without in any way entering upon a discussion of the value of the study of calculus to a student from the standpoint of technical training and culture.

The transactions of the American Society of Mechanical Engineers were selected as possibly representing the best literature covering the general field of mechanical engineering that is produced by the engineers of America.

The tabulation embodies a review of the transactions published during the last ten years, 1910 to 1919 inclusive.

Date of Transaction.	Pages Reviewed.	No. of Papers.	No. of Papers Showing Any Integration.	No. of Papers Showing Integration, Beyond 1st Differentials.	No. of Discussions.	No. of Disc Showing Integration.
1910.....	1,400	28	0	0	171	2
1911.....	1,150	36	2	0	155	2
1912.....	1,423	37	3	0	169	19
1913.....	954	37	1	1	150	0
1914.....	1,057	40	2	0	172	1
1915.....	1,435	53	0	0	175	2
1916.....	1,270	47	1	0	289	1
1917.....	1,160	48	2	0	211	1
1918.....	1,120	48	3	1	232	0
1919.....	1,060	46	0	0	113	1
Totals	12,029	420	14	2	1,837	29

USE OF CALCULUS.

SUMMARY.

Percentage of papers showing any integration whatever 3.3%
Percentage of papers showing integration of anything beyond first differentials 0.5%
Percentage of discussions showing any integration 1.6%

Notes: (*a*) The above tabulation represents a more or less hurried review of the volumes specified but it is believed that the data given are substantially correct. In order, however, to facilitate the checking of above data, the following list of paper numbers in which calculus was discovered is submitted:

Nos. 1315, 1341, 1349, 1353, 1364, 1402, 1436, 1458, 1541, 1616, 1617, 1645, 1658, 1660.

(*b*) Appendices were counted as discussions in the tabulation.

DISCUSSION.

TO THE EDITOR OF ENGINEERING EDUCATION:

I have read Professor Huntington's article in the December number of ENGINEERING EDUCATION, and I certainly take no exception to the title, "Agreed—upon units in mechanics;" but it seems to me to be a very serious fault of Professor Huntington's proposal that the exceedingly important and fundamental quantitative notion of mass should be suppressed.

Let it be understood that what the physicist and the chemist call mass is precisely what the coal-man and the grocer call weight. It is measured by the balance scale. It is properly expressed in grams or kilograms or pounds or tons. It is a quantitative notion which is independent of location or of any relationship to the earth. Ten thousand pounds of sugar; what more need be said?

Let it be understood also that what is technically called weight, the gravity pull on a body, is not measured by the balance scale and it is incorrect, logically incorrect, to use the coal-man's weight for W in the familiar expression W/g. Professor Huntington does not do this, he is entirely consistent and logical from start to finish, but in my opinion he does not go far enough and for the following reasons.

It is certainly true, as Professor Huntington claims, that any units whatever can be used in his scheme. It is equally true that a system of book keeping can be easily devised in which every specification of value, every item of debit or credit, would stand whether one used pounds, or francs, or dollars, or Chinese cash. All that would be required would be to specify, only, the ratios of all the values involved in a set of transactions.

Any units whatever can be used in Professor Huntington's scheme because Professor Huntington refrains from the use of a definite arbitrary unit for one thing or another, or sup-

presses some quantity or other in every equation he proposes to use.

Now, every laboratory man knows that ratios, only, are significant experimentally; and every economist knows that the dollar, however glibly we may speak of it in our dickerings with each other, is not a fixed standard of value. Nevertheless the use of the dollar contributes enormously to directness and simplicity in commercial specifications, and the use of accepted units contributes no less to directness and simplicity in physical specifications. My own carefully considered opinion is that it is as objectionable to refrain from the use of definite arbitrary units in physics as it would be in commerce.

I interpret Professor Huntington's proposal partly by what he has said about it in previous articles, and the essence of his proposal is that he refuses to introduce the quantitative idea of mass into his fundamental dynamical equation, and, unquestionably the quantitative idea of mass is as significant and as serviceable as any other quantitative idea in physics.

Acceleration certainly varies from force to force for a given body, and this mode of variation is most clearly and most completely grasped by setting up a quantitative notion of force, by defining force as a measurable quantity, to be expressed, of course, in terms of an arbitrary unit.

Acceleration also varies, most certainly, from body to body for a given force, and this mode of variation is most clearly and most completely grasped by setting up a quantitative notion of mass, by defining mass as a measurable quantity, to be expressed, of course, in terms of an arbitrary unit.

The generally accepted quantitative *definition* of force gives the equation

$$\frac{F}{F'} = \frac{a}{a'} \qquad \text{(i)}$$

for a given body.

The generally accepted quantitative *definition* of mass gives the equation

$$\frac{m}{m'} = \frac{a'}{a} \qquad \text{(ii)}$$

for a given force.

Equation (ii) cannot be derived from equation (i), nor can equation (i) be derived from equation (ii). Professor Huntington's statement * to the contrary is incorrect.

The wide utility of equation (i) depends not only on our having adopted the equation as a definition, but also upon a very far reaching generalization from experience, namely, *if F produces twice as much acceleration as F' for a given body, it will produce twice as much acceleration for any body whatever.*

Likewise the wide utility of equation (ii) depends not only on our having adopted the equation as a definition, but also upon a very far reaching generalization from experience, namely, *if body m is accelerated twice as fast as body m' by a given force, it will be accelerated twice as fast by any force whatever.*

Equation (i), taken by itself, conveys no knowledge of any other body, and it cannot therefore lead to equation (ii), which relates to two bodies. Likewise equation (ii), taken by itself, conveys no knowledge of any other force, and it cannot therefore lead to equation (i), which relates to two forces. It may seem that equation (i) together with the accompanying generalizing experience would lead to equation (ii); or that equation (ii) together with the accompanying generalizing experience would lead to equation (i); but either equation so derived cannot be shown to be entirely general. The experience which generalizes equation (i) is not coextensive with the experience which generalizes equation (ii).

The recognition of a clearly defined and measurable quantity always depends upon and grows out of far reaching invariant relations, these invariant relations are the things of real importance, and they are most clearly and most completely grasped by using the quantitative notion which grows

* See *Science*, March 3, 1916; page 15.

out of them. Consider equation (i), for example, as a mere definition; it would have been discarded long ago as useless if experience had not shown that if this equation is true for one body it is true for any body whatever. In fact the quantitative notion of force serves so well to suggest this wide experimental fact that it is never questioned when the most completely particularized quantitative definition of force is stated. Such is the chief utility of quantitative notions in physics, however much one may be inclined to think their utility is that they make numerical calculations possible.

To refrain from using the quantitative notion of mass seems to me therefore to be to most decidedly a mistake. I am convinced that Professor Huntington's proposal is based upon restricted and restricting ideas.

W. S. FRANKLIN.

MASS. INST. OF TECHNOLOGY,
CAMBRIDGE, MASS.

MEETING OF THE NEW ENGLAND SECTION OF THE S. P. E. E.

A meeting of the New England Section of the Society for the Promotion of Engineering Education was held on Saturday, March 12, at Worcester Polytechnic Institute, Worcester, Mass.

Meeting called to order at 11:10 A.M., in the Lecture Hall of the Electrical Engineering building, with Dean Anthony in the Chair.

Records of the meeting of the Committee on Formation of the Section were read and approved.

After a few preliminary remarks, Dean Anthony presented Dean Cooley, President of the Society, and requested him to make the opening remarks. In the course of these remarks, Dean Cooley called upon the Section to assist in a unified effort to make the annual meeting, to be held in New Haven next June, a success. He spoke of the criticisms of the young technical graduate by the employer, and called attention to the necessity of meeting these criticisms, and also to the fact that while the colleges can probably not do it all, they can assist very materially by broadening out the education of the engineering student, even at the expense of his technical work, if necessary. He called attention to the fact that no one institution can present a radical program and meet with any marked success, but that a number of the leading institutions might be able to do so, and thus lead the way.

President Hollis, of Worcester, was the next speaker. In the course of his remarks, he defended engineering education against some of the criticisms which have been brought against it. He also called attention to the larger function of the

college teacher, which should place him in closer relation to the industries.

At this point, it was voted to appoint a Committee on Nomination of Officers. It was also voted that the same Committee should present its recommendations concerning the organization and management of the Section. Messrs. Allen, Rockwell, Kenison, Votey, Hughes, Crouch, and Tilden were appointed.

Professor Scott, of Yale, presented a tentative program of the convention to be held at Yale next June.

The Section took a recess, and repaired to the Gymnasium, where a delicious lunch was served by the Institute.

The meeting was again called to order by Dean Anthony at 2:30 P.M. Professor Allen made the report for the Committee on Nominations and Organization as follows:

Recommended that the officers of the New England Section should be a Chairman and a Secretary, and that these officers should be elected at the first meeting held in any calendar year, and that they should serve until their successors are elected. It was also recommended that these officers should have entire control of the number and place of the meetings, and also of the program. The report was unanimously adopted. The Committee then presented nominations as follows: for Chairman of the Section for the ensuing year, Dean Gardner C. Anthony; for Secretary, Dean Harold S. Boardman. The report was adopted, and the officers declared elected.

The meeting was then open for a general discussion. There were no written papers, but the discussions were very animated, and dealt mainly with the subject proposed for this meeting, which was "The Teacher, and Teaching in Technical Schools." The discussion was direct and personal in that the speakers drew upon their own personal experiences dealing with their personal relations with students. Many spoke of instances in which the habits, or methods of work, or ideals of the students had been changed through the personal interest

and confidential counsel and advice which the teachers had given. This intimate discussion dealing concretely with the relations between teachers and students brought out phases of engineering teaching which are not found in papers. The sixty members and the considerable number of additional visitors were all regretful that the meeting could not be continued longer. Professor Allen proposed a resolution of appreciation for the very kind entertainment which the Worcester Polytechnic Institute, through President Hollis, had extended to the Section in this, their first meeting.

The registration of those present showed a total attendance of sixty-four, thirty-seven of whom were regular members.

Adjourned at 4:15 P.M.

H. S. BOARDMAN,
Secretary.
(University of Maine, Orono.)

The next meeting of the New England Section will be held on October 15 at the University of Maine, Orono. A party will leave Boston on the Bangor boat at 6:00 P.M. Friday, the preceding day. The Teaching of Physics in the Technical Schools will be the topic to be led by Professor W. S. Franklin, who "has prepared a large number of explosives that will put a tremendous amount of pep into the meeting and make everybody sit up and take notice."

COLLEGE NOTES.

Armour Institute of Technology.—The board of trustees of the Armour Institute of Technology has announced the appointment of Howard M. Raymond as acting president of that institution to fill temporarily the vacancy caused by the recent death of Dr. F. W. Gunsaulus.

Acting President Raymond is a graduate of the University of Michigan, and is well known professionally throughout the Middle West. He has been connected with the Institute for the past twenty-six years, and has served as dean of engineering since 1903.

His thorough knowledge of the steady development of the institution to its present high standing in the engineering field, and his clear conception of the future needs in engineering education, assure the uninterrupted fulfillment of the plans and policies of the Armour Institute of Technology.

LaFayette College.—The department of chemistry announces the two following research fellowships:

Two fellowships of $500 and $750, respectively, are open to students in chemistry holding the degree of Bachelor of Science in Chemistry or its equivalent. The holder of the fellowship is expected to spend the academic year in residence. He is not expected to do any teaching, and most of the time will be devoted to original research work.

The department of electrical engineering will offer a graduate course leading to the degree of Master of Science in Electrical Engineering.

The course will begin in September, 1921, and will consist of one year of resident study.

Graduates of institutions having the equivalent of four years' collegiate course in electrical engineering are eligible for admission.

School of Engineering of Milwaukee.—The department of automotive electrotechnics has recently been incorporated under the laws of Wisconsin as the School of Automotive Electricity. E. L. Consoliver is vice-president and general manager of the new organization.

Oregon Agricultural College.—An exhibition of work and activities pertaining to engineering was held in the new engineering laboratory and adjacent buildings, on Friday and Saturday evenings, April 1 and 2. This exhibition officially known as the "Engineering Show" was organized and put on by the student chapter of the American Association of Engineers and attracted a great deal of attention and favorable comment from a large number of visitors who thronged to the buildings each night.

The show consisted principally of work by students in the schools of engineering, mines and forestry, and the departments of chemical engineering and physics.

Students were regularly at work in the shops and laboratories while others acted as guides to conduct the visitors and explain the work. Attractive exhibits of finished work were conveniently arranged for inspection. Models of a high tension transmission line; an irrigation system, skidding and high line devices for handling saw logs, and a real timbered mine underground were some of the features. There were also demonstrations in wireless telegraphy, high tension electricity, and the breaking of a large wooden beam in one of the testing machines.

The traveling crane in the new laboratory building was brought into requisition and carried a car of sight-seers high above the heads of the crowds the entire length of the 200 feet bay of the main laboratory.

It was formerly customary to have these exhibitions annually but, owing to war conditions, this was the first held since 1916.

Purdue University.—Some extension work in engineering has been undertaken by the Schools of Engineering of Purdue University this year. A number of lectures have been given by various members of the electrical and mechanical engineering staffs to power plant men in several of the larger industrial centers of the state. Professor G. H. Sheppard, head of the department of industrial engineering and management, has been giving an extended course of lectures to a group of shop superintendents, and foremen from nineteen industrial concerns in Indianapolis. During the latter part of March the school of electrical engineering gave a short course for electric metermen. This course was well attended and will probably be given again next year. Instruction in the theory, connection and operation of watthour meters, maximum demand meters and power factor meters was given. In general the policy in extension work has been not to give instruction in fields already covered by other agencies such as the Federal Vocational Board, the Y. M. C. A. or the secondary schools of the state.

Students, alumni, and members of the faculty have subscribed $800,000 for the erection of a Student Union Building and the campaign for raising funds is still in progress. Plans are being drawn for a building which will have an initial cost of $1,000,000.

Mr. Seibert Fairman, a graduate of the Kansas Agricultural College, 1919, has become a member of the staff of the department of applied mechanics. Previous to coming to Purdue Mr. Fairman was employed in the turbine department of the General Electric Company at Lynn, Mass.

Dr. W. K. Hatt, of the School of Civil Engineering, is coauthor in a book, "Concrete Work," by Hatt and Voss, Wiley Technical Series. A bulletin of the Engineering Experiment Station on the flow of water through spiral riveted pipe, by Professor F. W. Greve, is now in press.

University of South Carolina.—In order to better fit those

engineering students, who expect to follow highway engineering, to assume their duties as highway engineers, and as a matter of pertinent information for all engineering students, there has been instituted as a regular part of the engineering course at the University of South Carolina a series of lectures by engineers of the State Highway Department of South Carolina. These lectures have been delivered by the different responsible heads of the State Highway Department and have covered in a thoroughly practical way all phases of highway work. These lectures have been of material value to the engineering students in that they have been given first-hand knowledge of what they will have to encounter as highway engineers.

In March the second Roads Institute was held at the University under the auspices of the State Highway Department and the Department of Civil Engineering of the University. These road institutes are held for the benefit of the state and county road officials and they are both a school of instruction and a means for the interchange of knowledge and ideas pertaining to all phases of road work. The Institute this year was attended by more than 100 road officials and was a material success. The next Institute will be held in January, 1922.

The department of engineering has this year been equipped with a standard motion picture machine and it is found to be a material aid from a standpoint of instruction. Films on various engineering subjects, particularly road work and some of the manufacturing industries, are available simply for the asking.

Perry M. Teeple (C.E. Lehigh, 1915) is again a member of the faculty of the engineering department, returning as adjunct professor of civil engineering and instructor in mining training. Mr. Teeple was instructor in civil engineering in 1915–16, 1916–17, and left to enter the United States Engineer Department as inspector in the Wheeling District. He was stationed at Dam No. 25, Ohio River, near Point Pleasant, W. Va., as junior engineer, and worked on surveys, design and construction in Wheeling and at this dam.

OBITUARY.

David Carlisle Humphreys of the faculty of Washington and Lee University died January 10. He was born in Smyth county, Va., October 14, 1855. When seventeen years of age he entered the employment of Major Jed Hotchkiss of Staunton, a noted mining and civil engineer. The enterprises of Major Hotchkiss were then devoted to the development of what at that day became widely known as the Pocahontas coal region. And in the engineering work there young Humphreys started his career. He entered Washington and Lee university as a student in 1875 and was educated in engineering, graduating in 1878 with the degree of C. E. He had the instruction of General Custis Lee, a most accomplished engineer between whom and Professor Humphreys there existed afterwards a most affectionate relation. A year spent at McDonogh school, Md., as instructor under Colonel William Allan was followed by his entering the service of the national government as engineer on the improvement of the Missouri river. The closing years of his connection with this work he had in charge the making of the first map and survey of the great Missouri river, his duties calling him far up into the mountains among the Indians. He laid aside active work in the engineering field in 1886 to accept an invitation to become adjunct professor of civil engineering at Washington and Lee, the department then headed by General Custis Lee. Three years later he was made professor in full charge of the department of engineering, the position he held up to the time of his death.

His engineering skill was never confined to teaching. On such subjects of interest to the community or county he ever took an active interest and his assistance was often invited. He was secretary of the building commission at Washington and Lee and supervised the construction of many of the im-

portant building improvements of the institution. In the construction of buildings in Lexington during his active career there were few of public interest in which his counsel and assistance was not invited. To some he gave active supervision. The county often made use of his services in the construction of county bridges of which so many were built in the last thirty years.

He held the position of resident hydrographer of the United States Geological survey from 1885 to 1898 and was a member of the government board of mechanical survey for Virginia.